In the claims:

Please amend claims 9, 39-41 and 43.

Please add new claim 46.

1-5. **(Canceled)**

6. **(Previously presented)** The recombinant inhibitor protein of claim 39, wherein the kallikrein is hK2 kallikrein.

7. **(Canceled)**

8. **(Canceled)**

9. **(Currently amended)** The recombinant inhibitor protein of claim 39 ~~8~~, wherein the serpin sequence is selected from the group consisting of α–1antichymotrypsin (ACT), protein C inhibitor (PCI), α–1antiproteinase (AAT), human α–1antitrypsin-related protein precursor (ATR), α–2-plasmin inhibitor (AAP), human anti-thrombin-III precursor (ATIII), protease inhibitor 10 (PI10), human collagen-binding protein 2 precursor (CBP2), protease inhibitor 7 (PI7), protease inhibitor leuserpin 2 (HLS2), human plasma protease C1 inhibitor (C1 INH), monocyte/neutrophil elastase inhibitor (M/NEI), plasminogen activator inhibitor-3 (PAI3), protease inhibitor 4 (PI4), protease inhibitor 5 (PI5), protease inhibitor 12 (PI12), human plasminogen activator inhibitor-1 precursor endothelial (PAI-1), human plasminogen activator inhibitor-2 placental (PAI2), human pigment epithelium-derived factor precursor (PEDF), protease inhibitor 6 (PI6), protease inhibitor 8 (PI8), protease inhibitor 9 (PI9), human squamous cell carcinoma antigen 1 (SCCA-1), human squamous cell carcinoma antigen 2 (SCCA-2), T4-binding globulin (TBG), Megsin, and protease inhibitor 14 (PI14), ~~fragments thereof, molecular chimeras thereof, combinations thereof, and variants thereof~~.

10. **(Previously presented)** The recombinant inhibitor protein of claim 39, wherein said recombinant inhibitor protein is selected from the group consisting of MD820, MD 62, MD 61, MD 67, and MDCI.

11. **(Canceled)**

12. **(Previously presented)** An isolated DNA sequence encoding the recombinant inhibitor protein of claim 39.

13. **(Previously presented)** The isolated DNA sequence of claim 12, wherein said sequence is selected from the group consisting of SEQ ID N° 1, SEQ ID N° 3, SEQ ID N° 5, SEQ ID N° 7, SEQ ID N° 9, SEQ ID N° 11, and SEQ ID N° 13.

14. **(Previously presented)** An expression vector comprising the isolated DNA sequence of claim 12.

15. **(Previously presented)** The expression vector of claim 14, further comprising a promoter operably linked to the isolated DNA sequence.

16. **(Previously presented)** A eukaryotic or prokaryotic host cell transfected with the expression vector of claim 14.

17. **(Previously presented)** A pharmaceutical composition comprising the recombinant inhibitor protein of claim 39 and a pharmaceutically acceptable carriers.

18. **(Original)** A method of treating or preventing a proteolysis-associated disorder in a mammal comprising administering to said mammal the pharmaceutical composition of claim 17.

19. **(Previously presented)** The method of claim 18, wherein the disorder is a disorder in which hK2 kallikrein activity is detrimental.

20. **(Previously presented)** The method of claim 19, wherein the disorder is selected from the group consisting of a cancer, an autoimmune disorder, an inflammatory disorder, and ~~or~~ an infectious disorder.

21. **(Previously presented)** The method of claim 20, wherein the cancer is selected from the group consisting of prostate cancer, breast cancer, and a metastasic cancer.

22. **(Previously presented)** The method of claim 20, wherein the inflammatory disorder is Benign Prostatic Hypertrophy.

23-27. **(Canceled)**

28. **(Previously presented)** A method for producing the recombinant inhibitor protein of claim 39, comprising

a) selecting a polynucleotidic sequence encoding a substrate active site specific for said Kallikrein;

b) introducing said polynucleotidic sequence into a sequence encoding a serpin, so as to obtain a recombinant inhibitor protein;

c) allowing expression of said recombinant inhibitor protein in a cell expression system under suitable conditions; and

d) recovering said recombinant inhibitor protein.

29. **(Previously presented)** The method of claim 28, wherein step a) is performed by phage-displayed library screening.

30. **(Previously presented)** The method of claims 28, wherein the suitable conditions comprise culturing the cell expression system at a temperature between 10-40°C during 10-30 hours.

31. **(Previously presented)** The method of claim 30, wherein the suitable conditions comprise a temperature of 16°C during 16 hours.

32. **(Previously presented)** The method of claims 28, wherein step d) is achieved by separation after extraction of said recombinant inhibitor protein from the cell expression system.

33. **(Previously presented)** The method of claim 32, wherein the separation of said recombinant inhibitor protein is achieved by affinity chromatography.

34. **(Previously presented)** The method of claims 28, wherein the recombinant inhibitor protein is further assayed for its ability to inhibit the activity of said kallikrein.

35. **(Canceled)**

36. **(Previously presented)** The method of claim 28, wherein the cell expression system is a bacterial cell.

37. **(Previously presented)** A diagnostic kit for the detection of a kallikrein in a specimen comprising a DNA sequence selected from the group consisting of SEQ ID N° 1, 3, 5, 7, 9, 11, 13, a sequence complementary thereof, fragments thereof, and variants thereof.

38. **(Previously presented)** A diagnostic kit for the detection of a kallikrein in a specimen comprising the recombinant inhibitor protein of claim 39.

39. **(Currently amended)** A recombinant inhibitor protein, or an inhibiting fragment thereof, ~~of~~ specific for a kallikrein, comprising a serpin sequence comprising a ~~wherein the~~ modified Reactive Serpin Loop (RSL) ~~of said serpin sequence~~, wherein the modified RSL is modified by at least one substrate active site sequence resulting in increased binding affinity ~~fragments thereof, a molecular chimera thereof, a combination thereof, and variants thereof, specific~~ for said kallikrein.

40. **(Currently amended)** A recombinant inhibitor protein, or an inhibiting fragment thereof, ~~of~~ specific for a kallikrein hK2, comprising a serpin sequence comprising a ~~wherein the~~ modified Reactive Serpin Loop (RSL), wherein the modified RSL ~~of said serpin sequence~~ is modified by at least one substrate active site sequence resulting in increased binding affinity, ~~fragments thereof, a molecular chimera thereof, a combination thereof, and variants thereof, specific~~ for said kallikrein hK2.

41. **(Currently amended)** A recombinant inhibitor protein, or an inhibiting fragment thereof, ~~of~~ specific for a kallikrein, comprising a serpin sequence comprising a modified ~~wherein the amino acid sequence of the~~ Reactive Serpin Loop (RSL), wherein the amino acid sequence of the modified RSL ~~of said serpin sequence~~ is selected from the group consisting of SEQ ID No 16, 17, 18, 19, 20, 21, and 22. ~~fragments thereof, molecular chimeras thereof, combinations thereof, and variants thereof~~.

42. **(Previously presented)** The recombinant inhibitor protein of claim 39, wherein the at least one substrate active site sequence specific for said kallikrein is a substrate peptide selected by said kallikrein using a phage-displayed random pentapeptide library.

43. **(Currently amended)** A ~~chimeric~~ recombinant inhibitor protein, or an inhibiting fragment thereof, ~~of~~ specific for a kallikrein, comprising a serpin sequence comprising a modified ~~wherein, the~~ Reactive Serpin Loop (RSL), wherein a P6 – P6' region of the RSL ~~of said serpin sequence~~ is modified by at least one substrate active site sequence. ~~fragments thereof, a molecular chimera thereof, a combination thereof, and variants thereof, specific for said kallikrein.~~

44. **(Previously presented)** A purified and isolated DNA sequence encoding the recombinant inhibitor protein of claim 39.

45. **(Previously presented)** A purified and isolated DNA sequence encoding the chimeric inhibitor protein of claim 43.

46. **(New)** The recombinant inhibitor protein of claim 43, wherein a P3-P3' region of the RSL is modified by at least one substrate active site sequence.